

Low Temperature Trash Gasification Reactor, Phase I

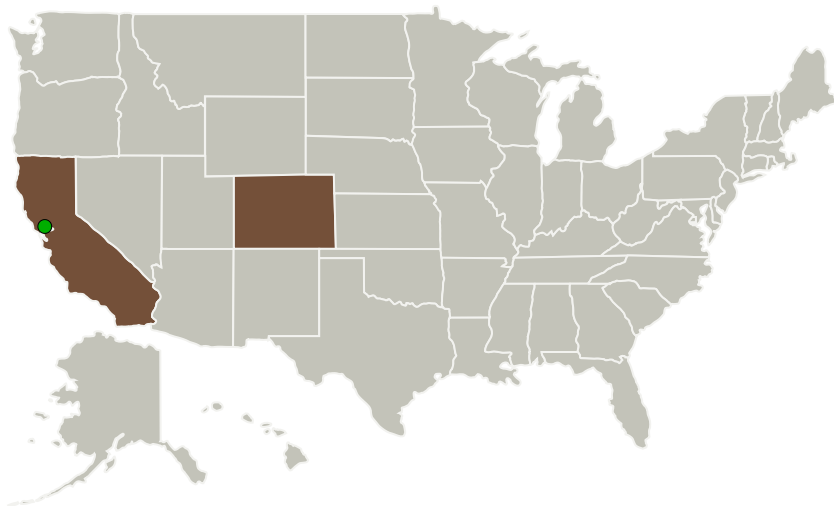
Completed Technology Project (2013 - 2013)



Project Introduction

Converting in-situ resources into propellants, energy storage reactants, or other useful products at the site of exploration, known as in-situ resource utilization (ISRU), instead of transporting these supplies from Earth can significantly reduce the cost and risk of human exploration while at the same time enabling new mission concepts and long term exploration sustainability. NASA needs innovative gasification reactors to convert trash into useful intermediate products such as carbon dioxide and water, which can ultimately be used to make methane and oxygen for propulsion and energy generation applications. Unfortunately, partial oxidation reactors and incinerators that might be used to reduce trash to useful products operate at high temperatures and also create ash, tar and other undesirable by-products. TDA Research has developed a low temperature (< 135 degrees C) ozone oxidation process that efficiently and cleanly converts trash into carbon dioxide and water. These intermediate products can then be delivered to a Sabatier reactor for the production of methane and oxygen. However, our reactor was designed for use on the moon or Mars whereas future spacecraft will need systems able to function in zero-g and micro-g environments. Therefore, TDA proposes to develop a trash gasification reactor that uses our ozone oxidation process and will work in the absence of gravity. In this project we will conduct the analysis and experiments to design the reactor.

Primary U.S. Work Locations and Key Partners



Low Temperature Trash Gasification Reactor

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Organizations Performing Work	Role	Type	Location
TDA Research, Inc.	Lead Organization	Industry	Wheat Ridge, Colorado
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Colorado

Project Transitions

▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138271>)

Images

**Project Image**

Low Temperature Trash Gasification Reactor

(<https://techport.nasa.gov/image/129008>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TDA Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert A Copeland

Co-Investigator:

Robert E Copeland

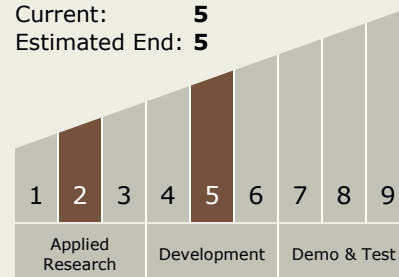
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Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.1 Logistics Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System